

**Illinois Commerce Commission**  
**Pipeline Safety**  
**Field Trip Report**

<b>Operator: NORTHERN ILLINOIS GAS CO.</b>	<b>Operator ID#: 13710</b>
<b>Exit Meeting Contact: (Not Applicable)</b>	<b>Total Man Days: 0</b>
<b>Pipeline Safety Representative(s): Jim Watts</b>	
<b>Company Representative to Receive Report: Leticia Quezada</b>	<b>Emailed Date:</b>
<b>Company Representative's Email Address: lquezad@aglresources.com</b>	02/06/2013

**Inspection Summary**

<b>Inspection Type</b>	<b>Location</b>	<b>ICC Analyst</b>	<b>Inspection Unit(s)</b>	<b>Man Day(s)</b>	<b>Inspection Date(s)</b>	<b>Contact(s)</b>
Compliance Follow-Up	Naperville G.O.	Jim Watts	TRANSMISSION - G.O.	0	3/29/2012	Clint Wybark, Dave Turk, Leticia Quezada

**Statement of Activities**

On March 29, 2012, Staff met with the Nicor Gas ("Nicor") personnel defined above to review the actions taken in response to a system overpressure reported to the Illinois Commerce Commission ("ICC") by Nicor. The overpressure was reported having occurred around 6 am on March 15, 2012, on a segment of high pressure distribution system that is supplied natural gas ("Gas") by Station 228 located on Black Road approximately 2 miles northwest of Shorewood, Illinois. Nicor states that upon arrival of a Nicor Transmission Department Crew ("Nicor Crew") at Station 228 at approximately 11:20 am on March 15, the Nicor Crew reviewed the pressure recording chart ("Chart") and observed the pressure of the high pressure distribution system downstream of Station 228 had increased from the normal operating pressure of 220 pounds square inch gauge ("PSIG") to approximately 370 psig. The pressure increase started at approximately 12 am and reached the highest pressure at approximately 6 am. The chart then indicated the pressure decreased gradually back down to approximately 220 psig by 9 am. Nicor reported the high pressure distribution system downstream of Station 228 has a maximum allowable operating pressure ("MAOP") of 230 psig.

Upon observing the abnormally high pressure, the Nicor Crew notified their supervisor. The supervisor then informed the Manager of Transmission of the apparent system overpressure. Due to the observed decrease in system pressure believed to be a result of increased gas consumption, the Nicor Crew was requested by their supervisor to continue monitoring the 230 psig system to ensure the pressure continued to decrease. The Nicor Crew was also instructed to take the necessary actions if they observed any increase in system pressure above 230 psig. At 1 pm on March 15, the Nicor Crew reported the system pressure was back to normal and was indicating a pressure of 220 psig. The two, Vortex pilot heaters located at Station 228 were valved off at this time. As a precautionary measure to further protect the downstream system piping against overpressure a Fisher 630 relief was installed on the outlet piping at Station 228 until the reason for the overpressure was established. Nicor Crews inspected Station 228 and the three distribution stations that are supplied gas via the high pressure distribution system supplied by Station 228. No increase in the outlet pressures of the stations that supply gas to the 60 psig MAOP distribution systems was observed during the station inspections and no explanations were established as to why the outlet pressure increase was observed at Station 228.

Nicor posted personnel to monitor the operation of Station 228 on the evening of and through the night of March 15, 2012. The crew reported that no issues were observed while monitoring the station and system pressure. The station was also monitored on March 16, with no increases in pressure being observed. The Nicor Crew that monitored Station 228 on the night of March 15 reported that during the gas consumption throughout the night was minimal and at multiple times the gas flow decreased to a point where no gas was heard flowing through the two station regulator runs. The system downstream of Station 228 maintained a pressure of approximately 218 to 225 psig and the pressures observed during monitoring periods were established using a calibrated digital gauge. Due to the initial increase observed in the downstream system pressure of Station 228, Nicor performed spot checks on the station on Saturday and Sunday March 17 and 18, 2012, with no increase in system pressure being observed above the normal outlet pressure.

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Due to the observed overpressure, Nicor personnel performed a leak survey over the high pressure distribution system mains and facilities that observed the increase of gas pressure to approximately 370 psig. During the leak survey ("Survey"), approximately 4 miles of piping were inspected with no leakage being detected. During the survey Nicor established that one service line is connected to the 230 psig system and was inspected for leakage. Nicor established after completing a document search, the service line was not initially identified by the customer database search as being served by the 230 psig pressure system. Further review performed by Nicor established a data entry error had occurred when the service line information was initially manually entered into Nicor's customer database system. The information was corrected and is now identified being served from the 230 psig system. As a precautionary measure Nicor replaced the first cut regulator at the farm tap that performed the initial reduction in pressure for the service line after being subjected to the increased system pressure of 370 psig.

On March 19, 2012, Nicor initiated an investigation to attempt to determine the reason for the system overpressure. Nicor reported they conducted visual inspections at Station 228 and the three distribution stations on March 15, and 16, 2012, to observe system pressures and ensure proper operation of the pressure reducing equipment with no issues being reported. They also performed random visits during the weekend of March 17 and 18, 2012, with no improper operation being observed.

#### **Station 228 and Downstream System Design and Operation;**

Station 228 receives gas from a Nicor Transmission pipeline and reduces the varying inlet pressure of 620 to 520 psig to an outlet pressure of 218 to 220 psig. The station outlet pressure supplies gas to three pressure reducing stations/vaults that further reduce the inlet pressure of 220 psig to approximately 58 psig and supply gas to the surrounding distribution systems for consumption by Nicor customers.

The piping within the 230 psig system located downstream of Station 228 is constructed of 8 inch X52 steel pipe with a wall thickness of 0.219 inches and 6 inch X42 steel with a wall thickness of 0.188 inches. There are no high consequence areas ("HCA's") or identified sites on the 230 psig system because it is operating at less than 20% specified minimum yield strength ("SMYS") (6 inch 9.3% SMYS and the 8 inch is 8.3% SMYS) and is not designated as transmission by Nicor. The pressure system downstream of Station 228 is not monitored by the Nicor Supervisory Control and Data Acquisition System ("SCADA") utilized to monitor the transmission system pressures and report alarms when maximum/minimum pressures or other system operating parameters are exceeded. Due to this system not being part of the transmission system, SCADA is not utilized for real time monitoring/reporting on smaller systems such as that supplied by Station 228.

The pressure regulating equipment located at Station 228 is designed with parallel runs of operator/monitor regulators utilized to perform the pressure reduction/overpressure protection to a maximum outlet pressure of 230 psig. The regulators utilized at Station 228 to perform the pressure reduction are 3 inch Grove Flex Flow pilot loaded regulators which are set to maintain an outlet pressure of 220 psig. Monitor regulators utilized for overpressure protection are located upstream of the operator regulators and are 3 inch Fisher 310 pilot loaded regulators. The monitor regulators were set to maintain an outlet pressure of 230 psig. The secondary run at this station is designed with the same regulators and the standby regulator was set to operate at approximately 2 psig below the primary regulator run set point of 220 psig. Both regulator runs at Station 228 have separate Vortex pilot heaters ("Vortex Heater") that were installed in 2005. The pilot heaters are utilized to warm the gas supplied to the operator and monitor regulator pilots to prevent the gas from being affected by a refrigeration effect that occurs when gas is passed through a reduced venturi or reduced port opening such as a seat and orifice in a pilot regulator. The Vortex heater utilizes a vortex flow design within the heater unit to warm the gas as it passes through the unit. Upstream gas pressure is reduced from the varying station inlet pressure to a maximum operating pressure of 250 psig. The inlet gas passes through the Vortex unit and warms the gas which is then supplied to the pilots of the operator and monitor regulators. The gas pressure supplied to the Vortex heater is controlled utilizing a 3/4 inch Fisher 627 HM regulator with a 3/8 inch orifice and was set to supply 222 psig to the heater unit. The Vortex unit is protected against overpressure using the 627 HM regulator. There is no filter or moisture/debris trap located upstream of the 627 HM regulators. The gas that flows through the Vortex heater is supplied to the operator and monitor regulator pilots to preventing freezing of the moisture present in the gas stream as it passes through the pilot regulator being utilized as the controlling unit of a pilot loaded regulator. The Vortex heater units have a downstream bleed

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that allows any excess gas that is not being utilized to supply the pilots to flow into the downstream pressure system through 3/8 inch stainless steel tubing. The downstream bleed is required to maintain gas flow through the Vortex heater at all times to allow for the production of heated gas. If there is no flow through the Vortex unit the gas provided to the pilots is no longer being heated and could allow the pilots to freeze up and affect the operation of the pilot loaded regulators.

Nicor's initial investigation into the overpressure included an inspection of the pressure regulating and overpressure protection equipment associated with Station 228. On March 19, 2012, further field inspections were performed on the system regulators and the regulators supplying the Vortex heaters. The set point of the Vortex heater inlet regulator for run 1 at Station 228 was indicating a set point of 265 to 268 psig. The inspection of the pressure regulating and overpressure protection equipment indicates they were operating properly and observed the highest lock off pressure of 231 psig. Inspection of the pilot regulator for Run 1 observed minimal signs of liquids was present. There was an indication of liquids in the operating run pilot filter located upstream of the pilots for the operator regulator run and indicated a minimal presence of liquids when blown down. The bypass run valve was inspected and indicated no presence of liquids. No signs of liquids were observed in the operator or monitor regulator bodies. Inspection of the Vortex heater supply pressure regulator located upstream of the Vortex unit, detected the presence of approximately 1/2 inch of liquids were present in the 3/8 inch downstream control line tubing of the 627 regulator. There is no filter or trap upstream of the pressure reducing regulator for the Vortex unit. Inspection of the supply regulator for the Vortex heater unit observed the regulator of run 1 was locking off between 259 to 265 psig during multiple tests. Due to the initial overpressure Nicor installed a Fisher 630 relief on the outlet side of the station and left the Vortex heater valved off. Nicor returned on March 20, 2012, and removed the Vortex unit that appeared to be the cause of the overpressure and transported the unit, associated tubing and pressure regulator to Nicor's Research and Development ("R&D") Lab located in Naperville, Illinois for further inspection and testing. Nicor disassembled the Vortex heater supply pressure regulator removed from Station 228, inspected the internal components and spring observing slight scrapes on the seat. Tests performed after reassembling the regulator indicates that lock off was achieved within acceptable pressures and was conducted at multiple inlet pressure ranges from 300 psig to 500 psig.

**Actions Taken by Nicor to Ensure System Safety after Detecting the Overpressure;**

Nicor performed a leak survey on approximately 4 miles of piping within the 230 psig high pressure distribution system and detected no indications of leakage. Nicor reported that there were no unrepaired/outstanding leaks on the 230 psig system prior to the date of the overpressure. Nicor initially reviewed their customer data system information and established that there were no customers that are supplied gas directly from the 230 psig system. During the leak survey a farm tap installation was identified being supplied gas from the 230 psig system. The service line was inspected for leakage with no leaks being detected. To ensure safety of the facility, the farm tap first cut regulator was replaced to ensure that the regulator was not affected by the pressure increase during the overpressure. The initial farm tap regulator was reported being designed for a maximum operating pressure of 500 psig. Further review of the customer facility documentation was performed by Nicor and established there was a data entry error on the initial service installation order that was manually entered into the customer database system. The error was corrected in the system and the customer is now identified being served from the 230 psig system.

Nicor performed a review of the 230 psig system to establish if all of the known components in the system were designed for the pressure applied during the system overpressure. Nicor identified no components that were not rated for the pressures applied during the overpressure. The three distribution systems stations supplied by Station 228 were inspected and found to be operating properly and were not affected by the overpressure. The distribution systems maintained outlet pressures of 56 to 58 psig during the interval of the overpressure.

Nicor reviewed the weekly charts for Station 228 prior to the overpressure and observed no indications of increased pressures prior to March 12, 2012. The chart present on the chart recorder at Station 228 from March 13 to the 19, 2012, was reviewed and indicated a system pressure increase to 254 psig occurred on the morning of March 13, 2012 around 2 a.m. and then went back down to a normal system pressure at approximately 6 a.m. On March 14, 2012, the system pressure began increasing again at approximately midnight and reached a maximum pressure of approximately 370 psig at 6 a.m. The pressure then returned to a normal operating pressure by approximately 9:30 a.m.

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Nicor inspected the chart recorders that were monitoring the 230 psig system to ensure no damages had occurred due to the overpressure. The tests performed determined that the chart recorders were operating properly. System equipment reviews performed by Nicor after the overpressure established that there are two other stations that were using the Vortex heaters and these were isolated and they will be removed and replaced with different pilot heater equipment. Nicor reported that Station 228 last annual inspection was performed in June of 2011. The chart recorder utilized to record system pressures is inspected weekly and there was no record of issues being identified and recorded in the Station log utilized by Nicor to record the findings of the weekly inspections performed by the Nicor personnel who replace and review system charts. The chart that indicated the overpressure at Station 228 was changed out on the morning of March 13, 2012 around 9 a.m.

Findings;

Staff's review of the inspections, tests performed and the actions taken by Nicor, indicate the increase in system pressure was a result of a combination of the liquids present in the Vortex heater regulator that affected the ability of the supply regulator to adequately control the gas pressure supplied to the Vortex unit and the lack of sufficient gas demand downstream of Station 228 to utilize the increased gas pressure being passed downstream through the bleed line of the Vortex heater unit. Due to the above findings, Nicor has removed the existing Vortex units and discontinued use of the Vortex pilot heaters in their systems.

**ISSUE(S) FOUND:**

NO ISSUES FOUND.

**ISSUE(S) CORRECTED:**

NO ISSUES CORRECTED.

**NOTICE OF AMENDMENT(S) FOUND:**

NO NOAs FOUND.

**NOA(S) CORRECTED:**

NO NOAs CORRECTED.

**NOTICE OF PROBABLE VIOLATION(S) FOUND:**

NO NOPVs FOUND.

**NOPV(S) CORRECTED:**

NO NOPVs CORRECTED.